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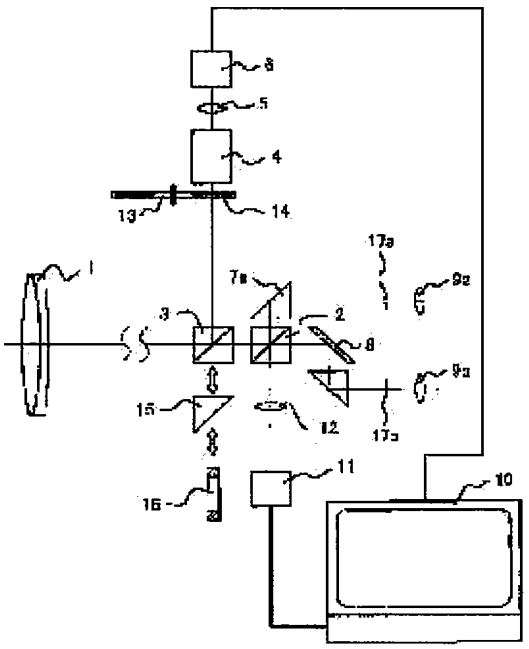
(54) ASTRONOMICAL TELESCOPE

(57)Abstract:
PROBLEM TO BE SOLVED: To provide an astronomical telescope which has the feel of reality and with which bright observation images are obtainable.
SOLUTION: The astronomical telescope comprises an optical path splitting means for splitting the luminous flux past an objective lens to two directions, an observation optical system for direct observation of the image of the objective lens by one of the split luminous fluxes, an optical multiplier means for increasing the brightness of the image of the objective lens by the other of the split luminous fluxes, an image processing means for subjecting the image multiplied by this optical multiplier means to various kinds of processing, an image display means for displaying the image formed by the image processing mean and an imagery optical system for forming the image displayed on the image display means to the focal position of the observation optical system described above.



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[0010]

Fig. 1 is an optical system layout diagram of an astronomical telescope of a first example embodiment of the present invention. Light from a deep-sky object (object to be observed) is divided into two flux of light by optical path splitting member 3 after passing through objective lens 1. One advances to beam splitter 2, and other advances to image intensifier 4. Optical path splitting member 3 and beam splitter 2 are located along the same axis. Optical path splitting member 3, image intensifier 4, relay lens 5, and CCD camera 5 are located along the same axis.

[0011]

Incident light into beam splitter 2 is split into two optical paths by beam splitter 2, and one of the two paths is formed on focus plane 17a of eyepiece lens 9a through bending prism 7a. Other is formed on focus plane 17b of eyepiece lens 9b through bending prism 7b. Up to here, the optical system of Fig.1 is the same as the optical system of a binoculars observation apparatus as shown in Fig.3.

[0012]

The light advancing to image intensifier 4 is formed on fluorescent screen (not shown in the drawing) existing within image intensifier 4, and this image is captured by CCD camera 6 via relay lens 5. The image captured by CCD camera 6 is taken into image processing apparatus 10 (for example, PC for simplicity), and image processing such as contrast intensification, noise reduction, color composite (color imaging) etc. is performed.

[0013]

Also, as shown in Fig. 4, with various kinds of spectro filters 14 attached to turret 13, these spectro filters 14 are inserted into the optical path, and the color image can be obtained by combining respective color images.

[0014]

The image undergoing the image processing is output from liquid crystal display element 11 in which a picture element is arrayed two-dimensionally. This image is split into two by beam splitter 2 via image forming lens 12. One of them is formed on focus plane 17a of eyepiece lens 9a through bending prism 7a. Other is formed on focus plane 17b of eyepiece lens 9b through mirror 8 and bending prism 7b.

[0015]

Accordingly, on focus planes 17a and 17b, there are superimposed two images, that is, a directly observed image not through image intensifier 4, and a post-processed image having brightness intensified with image intensifier 4 and undergoing the image processing. So that it becomes possible to observe these two superimposed images with eyepiece lenses 9a and 9b at the same time.